

Chapter 3

Theories on Banking Firms: Models based on Industrial Organization Theory

The objective of this chapter is to analyze how economic theory models the activity of banks. Since banks differ from other economic agents due to their intermediation activities, it is necessary to develop models that examine banking behavior, highlighting its essential aspects and constraints.

The models analyzed in this chapter are based on Industrial Organization Theory, which applies microeconomic models to specific sectors of activity (e.g., health, transport). Here, we apply microeconomic models to the banking industry, analyzing the individual behavior of banks as independent entities with their own objectives and strategies. A model is always a simplification of reality, emphasizing fundamental aspects. Thus, the theories on the banking firm analyzed here highlight the primary aspects of banking intermediation activities.

3.1 The Banking Firm in Perfect Competition

First, we will analyze how the behavior of a banking firm is modeled under perfect competition.

A bank accepts deposits (D) and grants loans (L). In a perfectly competitive market, firms are price-takers, meaning they cannot influence market prices. Thus, it is assumed that r_L represents the interest rate on loans, r_D represents the interest rate on deposits, and these two interest rates are fixed and constant, meaning an individual bank cannot alter them. The bank

can only determine the quantities it produces, that is, the amount of deposits accepted and loans granted.

We will consider that banks operate in the money market, where they can borrow from or lend to other banks. By assumption, this interbank market is an international market with many participating banks, and each bank is a price-taker. Let r_T represent the interbank market rate, which is also fixed, meaning an individual bank cannot alter it. The funds lent to or borrowed from the interbank market are denoted by T .

Note 1: Instead of assuming an interbank market, it is possible to consider a market for government debt securities (e.g., Treasury Bills), in which banks can apply funds at the constant rate r_T . However, this assumption has the disadvantage of only allowing the application of funds, not their acquisition by banks.

A bank is required by the Central Bank to hold mandatory reserves. If k represents the reserve requirement rate set by the Central Bank, the bank must hold reserves of at least kD .

Based on the assumptions made, the balance sheet of a bank can be represented as:

Assets	Liabilities
R	D
L	
T	

Finally, since the bank produces deposits and loans, and its operations are characterized by a given technology, its cost function is represented as: $C(D, L)$.

In this operational cost function (or intermediation cost function), it is assumed that marginal costs are positive and that the production costs of deposits and loans are independent.

The bank's objective is to maximize its profit (π), given by the difference between its revenues and costs:

$$\max \pi = r_L L + r_T T - r_D D - C(D, L).$$

The bank faces the constraint imposed by its balance sheet:

$$\text{Uses of funds} = \text{Sources of funds} \Rightarrow L + T + R = D \Rightarrow T = D(1 - k) - L.$$

Substituting this constraint into the profit equation, we get:

$$\pi = r_L L + r_T [D(1 - k) - L] - r_D D - C(D, L).$$

Under perfect competition, firms are price-takers, and thus their decision variable is the quantity to produce. In this case, the bank's decision variables are twofold: the quantity of deposits to accept and the volume of loans to grant. To maximize its profit, the bank differentiates its profit function with respect to the volume of loans and deposits, setting these derivatives equal to zero:

$$\left\{ \begin{array}{l} \frac{\partial \pi}{\partial L} = r_L - r_T - C'_L = 0 \\ \frac{\partial \pi}{\partial D} = r_T(1 - k) - r_D - C'_D = 0 \end{array} \right. \Leftrightarrow \left\{ \begin{array}{l} r_L - r_T = C'_L \\ r_T(1 - k) - r_D = C'_D \end{array} \right.$$

Each of these two profit maximization conditions can be interpreted as:

$$\text{Marginal Revenue} = \text{Marginal Cost.}$$

Thus, under perfect competition, the bank adjusts its loan and deposit volumes such that the interest rate margins on loans and deposits equal their respective marginal costs of production.

Using the two profit maximization conditions above, you can express the bank's intermediation margin as a function of the model's parameters. First, note that the intermediation margin is the difference between the interest rate on loans (r_L) and the interest rate on deposits (r_D):

$$\textbf{Intermediation Margin} = r_L - r_D (=) r_L - r_D = r_T k + C'_L + C'_D$$

The bank's profit-maximizing behavior implies that the sum of its marginal production costs and the opportunity cost of reserves equals the intermediation margin, which the bank cannot influence since it has no market power.

The assumption of separable cost functions for deposits and loans ($\frac{\partial^2 C}{\partial D \partial L} = 0$ and $\frac{\partial^2 C}{\partial L \partial D} = 0$) implies that an increase in L does not affect the marginal cost of deposits, and an increase in D does not affect the marginal cost of loans. In other words, there are no cross-effects between the two products, meaning the decision regarding the quantity of one does not influence the quantity of the other.

The perfect competition model, when applied to the banking sector, faces criticism. The firm maximizes profit independently of other firms' decisions and does not account for constraints on the demand for its products. This model is rarely used to describe the sector because the banking industry is not atomistic; the behavior of one firm depends on and influences the behavior of others.

However, its advantage lies in synthesizing some essential aspects of banking activity:

- The importance of the intermediation margin;
- The significance of the reserve requirement rate, which affects banks' costs and profitability.

References

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